

WHAT IS CLAIMED IS:

1. A motion controlled handheld device comprising:
 - a display having a viewable surface and operable to generate an image;
 - a gesture database maintaining a plurality of gestures, each gesture defined by

5 a motion of the device with respect to a first position of the device;

 - a motion detection module operable to detect motion of the handheld device within three dimensions and to identify components of the motion in relation to the viewable surface; and
 - a control module operable to:
 - 10 identify a base reference position of the device;
 - track movement of the device, using the motion detection module, to identify a potential gesture;
 - compare the potential gesture against the gestures in the gesture database; and

15 determine whether the potential gesture matches to a compared one of the gestures based on whether a difference between the potential gesture and the compared gesture is within a precision threshold.

2. The motion controlled handheld device of Claim 1, wherein the control module is further operable to:
 - identify a first precision threshold associated with a first set of the gestures;
 - identify a second precision threshold associated with a second set of the gestures, the second precision threshold requiring greater precision than the first precision threshold; and

25 apply a selected one of the first precision threshold and the second precision threshold based upon whether the potential gesture potentially matches to one of the first set of the gestures or one of the second set of the gestures.

3. The motion controlled handheld device of Claim 2, wherein the first set of the gestures includes basic control gestures and the second set of the gestures includes security access gestures.

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4. The motion controlled handheld device of Claim 2, wherein the second set of the gestures has a greater density of potential gestures within an area of space than the first set of the gestures.

5 5. The motion controlled handheld device of Claim 1, wherein a level of precision required by the precision threshold is based at least in part on an environmental state of the device, the environmental state comprising a motion state describing an amount of background noise expected in the components of the motion.

10 6. The motion controlled handheld device of Claim 1, wherein the control module is further operable to:

determine that the potential gesture does not match to the compared gesture within the precision threshold; and

15 generate a prompt indicating failure of user input to precisely match to the compared gesture.

7. The motion controlled handheld device of Claim 6, wherein the control module is further operable to:

20 determine that the potential gesture matches to the compared gesture within a recognition threshold;

modify the image to display the compared gesture; and

generate the prompt to indicate a simplified gesture for confirming an intent to input the compared gesture.

8. The motion controlled handheld device of Claim 1, further comprising:
 - a first accelerometer operable to detect acceleration along a first axis;
 - a second accelerometer operable to detect acceleration along a second axis, the second axis perpendicular to the first axis; and
- 5 a third accelerometer operable to detect acceleration along a third axis, the third axis perpendicular to the first axis and perpendicular to the second axis; and wherein:
 - the gesture database further defines each of the gestures using a sequence of accelerations;
- 10 the motion detection module is further operable to detect motion of the device using accelerations measured by the first accelerometer, the second accelerometer, and the third accelerometer; and
- 15 the control module is further operable to match the accelerations measured by the motion detection module against gesture definitions in the gesture database to identify particular ones of the gestures.

9. A method for controlling a handheld device comprising:
 - generating an image on a viewable surface of the handheld device;
 - maintaining a gesture database comprising a plurality of gestures, each gesture defined by a motion of the device with respect to a first position of the device;
 - 5 identifying a base reference position of the device;
 - tracking movement of the device in relation to the viewable surface to identify a potential gesture;
 - comparing the potential gesture against the gestures in the gesture database;
 - determining whether the potential gesture matches to a compared one of the
 - 10 gestures based on whether a difference between the potential gesture and the compared gesture is within a precision threshold.
10. The method of Claim 9, further comprising:
 - identifying a first precision threshold associated with a first set of the gestures;
 - 15 identifying a second precision threshold associated with a second set of the gestures, the second precision threshold requiring greater precision than the first precision threshold; and
 - applying a selected one of the first precision threshold and the second precision threshold based upon whether the potential gesture potentially matches to
 - 20 one of the first set of the gestures or one of the second set of the gestures.
11. The method of Claim 10, wherein the second set of the gestures has a greater density of potential gestures within an area of space than the first set of the gestures.
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12. The method of Claim 9, wherein a level of precision required by the precision threshold is based at least in part on an environmental state of the device, the environmental state comprising a motion state describing an amount of background noise expected in the components of the motion.

13. The method of Claim 9, further comprising:
 - determining that the potential gesture does not match to the compared gesture within the precision threshold; and
 - generating a prompt indicating failure of user input to precisely match to the compared gesture.

14. The method of Claim 13, further comprising:
 - determining that the potential gesture matches to the compared gesture within a recognition threshold;
 - 10 modifying the image to display the compared gesture; and
 - generating the prompt to indicate a simplified gesture for confirming an intent to input the compared gesture.

15. The method of Claim 9, wherein the gesture database further defines each of the gestures using a sequence of accelerations; the method further comprising:
 - detecting acceleration along a first axis;
 - detecting acceleration along a second axis, the second axis perpendicular to the first axis; and
 - detecting acceleration along a third axis, the third axis perpendicular to the first axis and perpendicular to the second axis;
 - 20 detecting motion of the device using accelerations measured by the first accelerometer, the second accelerometer, and the third accelerometer; and
 - matching the accelerations against gesture definitions in the gesture database to identify potential indicated ones of the gestures.

16. Logic for controlling a handheld device, the logic embodied in a computer readable medium and operable when executed to perform the steps of:

generating an image on a viewable surface of the handheld device;

5 maintaining a gesture database comprising a plurality of gestures, each gesture defined by a motion of the device with respect to a first position of the device;

identifying a base reference position of the device;

tracking movement of the device in relation to the viewable surface to identify a potential gesture;

comparing the potential gesture against the gestures in the gesture database;

10 determining whether the potential gesture matches to a compared one of the gestures based on whether a difference between the potential gesture and the compared gesture is within a precision threshold.

17. The logic of Claim 16, further operable when executed to perform the 15 steps of:

identifying a first precision threshold associated with a first set of the gestures;

identifying a second precision threshold associated with a second set of the gestures, the second precision threshold requiring greater precision than the first precision threshold; and

20 applying a selected one of the first precision threshold and the second precision threshold based upon whether the potential gesture potentially matches to one of the first set of the gestures or one of the second set of the gestures.

18. The logic of Claim 16, further operable when executed to perform the 25 steps of:

determining that the potential gesture does not match to the compared gesture within the precision threshold; and

generating a prompt indicating failure of user input to precisely match to the compared gesture.

19. The logic of Claim 18, further operable when executed to perform the steps of:

determining that the potential gesture matches to the compared gesture within a recognition threshold;

5 modifying the image to display the compared gesture; and

generating the prompt to indicate a simplified gesture for confirming an intent to input the compared gesture.

20. The logic of Claim 16, wherein the gesture database further defines each of the gestures using a sequence of accelerations; the logic further operable when executed to perform the steps of:

detecting acceleration along a first axis;

detecting acceleration along a second axis, the second axis perpendicular to the first axis; and

15 detecting acceleration along a third axis, the third axis perpendicular to the first axis and perpendicular to the second axis;

detecting motion of the device using accelerations measured by the first accelerometer, the second accelerometer, and the third accelerometer; and

20 matching the accelerations against gesture definitions in the gesture database to identify potential indicated ones of the gestures.

21. A motion controlled handheld device comprising:
 - means for generating an image on a viewable surface of the handheld device;
 - means for maintaining a gesture database comprising a plurality of gestures, each gesture defined by a motion of the device with respect to a first position of the device;
 - means for identifying a base reference position of the device;
 - means for tracking movement of the device in relation to the viewable surface to identify a potential gesture;
 - means for comparing the potential gesture against the gestures in the gesture database;
 - means for determining whether the potential gesture matches to a compared one of the gestures based on whether a difference between the potential gesture and the compared gesture is within a precision threshold.